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Physicochemical Properties of Egg Yolk Powder from Eggs of Different Types of Bird

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Abstract* — The goal of this study was to determine whether the physicochemical properties of egg yolk powders produced from eggs from different types of bird (Fighting chicken, Kampung chicken, Serama chicken, Leghorn chicken, Guineafowl, and Turkey) differ from each other and from those of commercial egg yolk powder. The powders were analysed to determine yield; proximate composition; colour, solubility; water holding capacity (WHC); and emulsion activity and stability. Egg yolk powders were prepared by separating the egg yolk manually followed by blast freezing and freeze drying. The weight of the egg ranged from 22.16 g for Serama to 66.25 g for Turkey. The lowest yield of egg yolk liquid was found in Leghorn egg (27.63) and highest in Serama egg (44.31). Egg yolk powder yield was also lowest for Leghorn eggs (12.85%) , followed by Turkey (15.85%), Guineafowl (16.22%), Kampung (16.48%), Fighting (16.62%), and the highest for Serama (18.92%). All parameters studied except WHC differed significantly ($p < 0.05$) among at least some of the different egg yolk powders. Egg yolk powder from Serama chicken had the highest protein content (40.77%), lowest fat content (51.96%), highest solubility (20.20 ^{0}Brix), and lowest WHC (79.78 %). Egg yolk powder from Fighting chicken had the highest emulsion activity (54.13%) and that from Leghorn chicken had the highest emulsion stability (48.41%). Egg yolk powder from Guineafowl had the highest yellowness intensity (72.21), whereas the value was lowest (35.84) for commercial egg yolk powder. In conclusion, physicochemical properties of egg yolk powder depend on the source of the eggs.

***Keywords* — egg yolk powder; local chicken breeds; layer chicken; physicochemical properties; proximate composition.**

I. INTRODUCTION

In the last three decades, chicken egg production increased 152% worldwide and that in Asia increased 388%, which shows that eggs are a common food source consumed by many [1] [,2]. Eggs are a main ingredient in many food products because of their high nutritional value, good functional properties, and unique sensory qualities [3]. The emulsifying properties of liquid egg yolk are of particular interest to food scientists. Egg yolks are used to make mayonnaise and salad dressing and are an important ingredient in other foods such as bakery products, custards, and pasta [4].

Dried egg powder (egg white and egg yolk) is widely used in food preparation because it is microbiologically safe and easy to transport compared to unshelled or liquid eggs. Dried egg powder also is also comparably easier to store, handle, measure, and obtain uniformity [5]. In addition, processing fresh eggs into powder form can extend the shelf life of the product to up to a year when refrigerated. Dried egg yolk offers uniformity relative to that of fresh eggs, as the composition of egg yolk may change over time because the porous shell allows exchange of carbon dioxide and moisture. Egg yolk powder can be reconstituted easily by mixing the powder with water, and the reconstituted product has the same nutritional value and functional properties as fresh egg yolks.

Commercial egg yolk powder normally is produced using the spray drying method. However, the high temperature required for spray drying may lead to protein denaturation, which negatively impacts the functional and physicochemical properties of the product [6]. Therefore, in this study the freeze drying method was used, as it is believed to have a minimal effect on egg yolk properties [7]. Lili et al. [8] reported that freeze dried egg white powder had higher emulsifying capacity and stability compared to spray dried egg white powder.